

Ancient Lake Bonneville Outlined; Effects on Ogden Given in Detail

O. J. Stilwell of Ogden Chamber of Commerce Continues Geological Discussions

Two weeks ago The Standard-Examiner published an outline prepared by O. J. Stilwell, secretary of the Ogden Chamber of Commerce, for teaching local geography in the public schools. The outline is in the form of a series of questions, the publication of which started a flow of demands from readers for the answers.

In last Sunday's issue, Mr. Stilwell answered the questions in section "A" of the outline, explaining the cause for the growth and development of Ogden, and comparing with Salt Lake City and other Utah towns.

Section "B" of the outline relates entirely to ancient Lake Bonneville. Mr. Stilwell's answers to the questions being embodied in the following paragraphs:

MANY ISLANDS.

"Ancient Lake Bonneville contained about the same amount of fresh water as Lake Michigan, but differed from Lake Michigan in that it contained many mountainous islands. Lake Bonneville was 246 miles long, 145 miles wide, 1650 feet deep, and covered 13,750 square miles. The chief remaining remnants of the ancient lake are Sevier lake, Utah lake and Great Salt lake. The greatest known dimensions of Great Salt lake was in 1869 when its length was 33 miles, width 51 miles, depth 49 feet and area 2179 square miles.

"The geologist, Gilbert, estimated the time when the great fresh water lake was here at not less than 19,000 years ago, and not more than 25,000 years ago.

"We know there was a great body of water here from the conspicuous shore lines on the mountain sides.

"In trying to determine what became of the lake, the geological survey discovered that the lowest point in the rim of the ancient lake in Red Rock Pass through which the Oregon Short Line railway now makes its way to Pocatello. At this point the lake found an outlet which drained off some 200 feet of its waters.

"The further disappearance of the lake has been caused by evaporation on account of change in climate.

"When Lake Bonneville was in its glory, it is probable the Sierran Nevada mountains were not so high as they now are, and that much more rain and snow came over from the Pacific ocean, also at the close of the glacial period, all the country to the north of us was much higher than at present, resulting in more rain and snow and less evaporation.

PRESENT EVAPORATION.

"The present evaporation on Great Salt lake is 80 inches per year—on Lake Michigan 22 inches, which means that if Utah had the climate of Michigan our lakes would raise five feet every year. When Lake Bonneville was here there was a glacier back of Mt. Ogden, and numerous other glaciers in the basin above the lake.

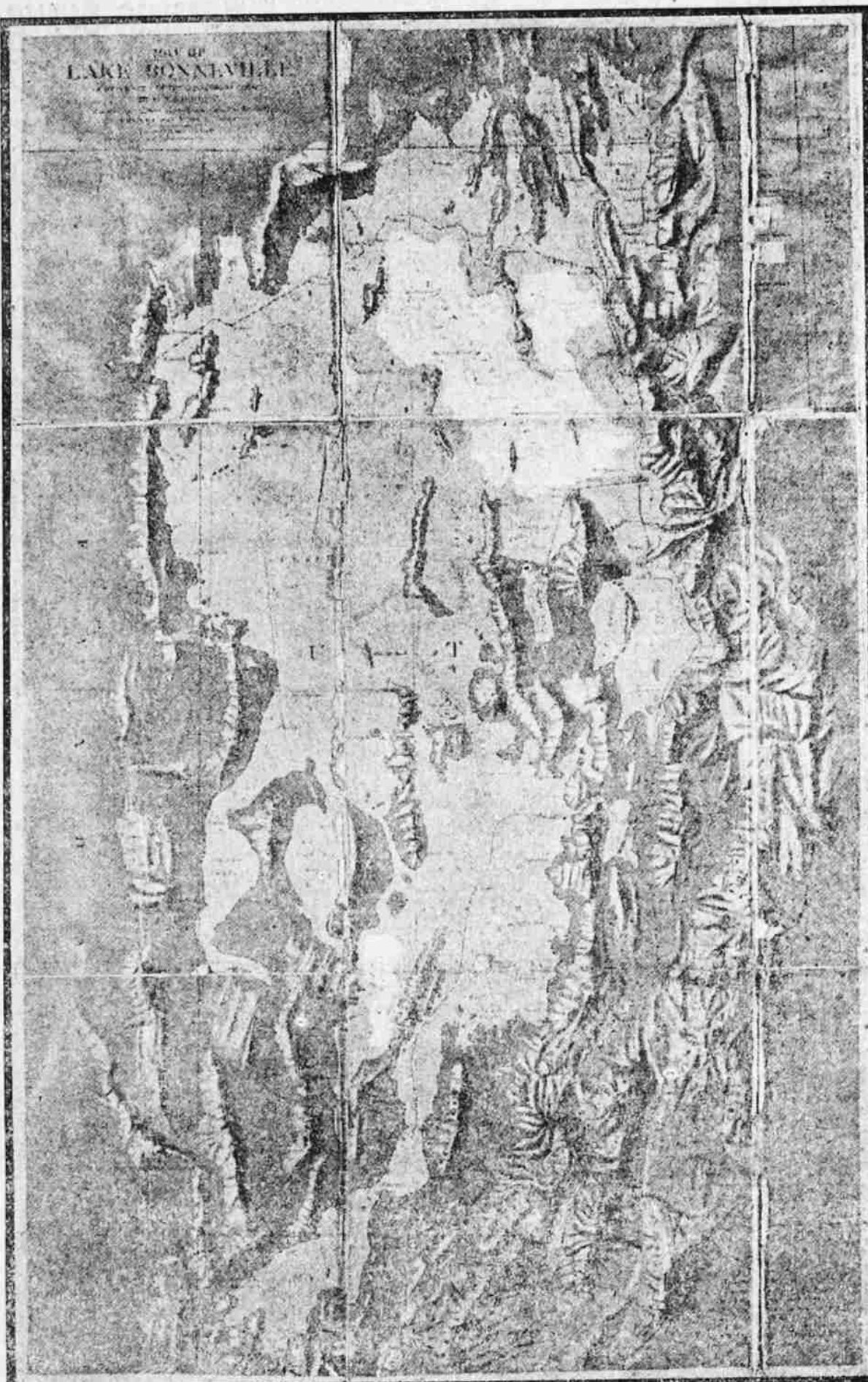
"There are two conspicuous shore lines because the lake stood at its highest point for many years forming the so-called Lake Bonneville shoreline, and later, after the outlet had cut down to rock bottom at Red Rock Pass, it again remained at that level for a very long period before it commenced to dry up, and at that level formed the so-called Provo shoreline. Below the Provo line there are many minor lines showing that in its decline it stood stationary for several years at certain levels, but there are no lines between the Bonneville and the Provo shores, showing that once started, the great lake drained off rapidly.

"With the waters drained off, bottoms of lakes are usually the sites of farming lands. Excepting near the shores, there are no rocks; the deposits from the lake have made a fertile soil, the drainage is excellent on account of the gentle slope away from the shore towards the center, and irrigation is most easy for the further reason that all the lands are below the ancient mouths of the water courses.

"If one stands at the north end of Harrison avenue, Ogden canyon is at his right, Ogden river below him. The river is formed by three branches—North Fork, Middle Fork and South Fork—all having their sources in the mountains of Weber county; the water sheds being the boundary line between Weber and adjoining counties.

"Ogden river unites with the Weber river just beyond Ogden city limits with which river it finds its way to Great Salt lake about twelve miles distant through a crooked channel of over twenty-five miles.

"A rather wide and shallow canyon



Lake Bonneville, reduced from map by the United States geological survey about forty years ago, now out of print. The prominent squares are folds in the paper on which the map was printed. Note the ancient lake extended into Nevada on the west, into Idaho on the north, within about forty miles of Wyoming on the east and within about sixty miles of Arizona on the south.

is called a coulee, the depression at the north end of Harrison avenue being a good example.

"When the lake was full there was no depression, but as the water went down the river gradually cut this deep and wide channel and carried the eroded material farther down, building the delta out farther into the lake to the west, as you can see in the map.

ESTUARIES.

"If the lake should again rise to the north end of Harrison avenue the coulee would be filled, the water extending for some distance up the can-

yon. The coulee would then be the deep and wide mouth of a river, called, in geography, an estuary, a fifth or sixth into which the largest vessels could sail.

"Canadian and northern European rivers nearly all end in estuaries made in the manner above suggested. The land of these sections was once from one to two thousand feet higher above the ocean than it now is, at which time the rivers cut immense canyons. When the land again descended to its present level the ocean filled these canyons and formed the estuaries.

"The St. Lawrence river is wider at its mouth than Great Salt lake, and very deep up to Montreal.

"The Hudson river could not cut a deep canyon from New York City since its bed was hard rock; but at that period the ocean was some seventy-five miles away, and the Hudson river did cut a canyon over a thousand feet deep out to the ocean. This channel is easily followed by soundings. The largest ships sail into the estuaries of the smallest rivers in Scotland, Norway and Sweden. Even our Potomac river is navigable up to Washington.

"The mouth of rivers south of about 40 degrees have never been so elevated above the ocean; the debris brought down by these has been built into deltas if the rivers flow north or south, and into narrow coastal islands if the rivers flow east.

"Our Ogden river coulee is growing wider, the walls being undermined in places by the river, causing a portion of the side of the coulee to settle.

"Since the writer came to Ogden, several acres of the northern grounds of the school for the deaf and blind settled thirty or forty feet in this way. Driving down Ogden canyon from a point below Becker's bridge, four such settlements in the rock of the south wall of the canyon may be observed.

FAULTS.

"If the water were drawn from a pond covered with thick ice, the ice would settle and crack in all directions. If on one side of a crack the ice were lifted several inches above the ice on the other side of the crack, that crack would be a miniature geological fault.

"The earth surface is thus cracked or faulted, the rocks on one side of the crack being raised above the rocks on the other side.

"Such a fault extends all around this valley for many hundreds of miles, the displacement being some forty feet. This fault shows distinctly on both sides of the mouth of Ogden canyon; but especially plain just south of the canal.

"This fault evidently extends to great depth for wherever it passes around a mountain hot springs occur, and the fault is also evidently gradually becoming greater for the friction of

the rocks grinding on each other heats water in contact with the rocks, thus causing hot springs.

"Where the great pipe line of the Utah Power & Light Co. crosses this fault south of the mouth of the canyon, the gradual increase of the fault placed such a strain on the steel pipe at that point that it broke and flooded the road and canal below. As this occurred some time ago, the cause was not known. The Germans had blown up the power system. Geological evidence is that a slipping of the formation in Yellowstone park of four inches in a century would be sufficient to account for all the phenomena there exhibited.

DUNES.

"A strong wind will raise sand, dust or sawdust, keep it moving so long as there is nothing to stop the wind. Any obstruction as a rock or a fence tends to stop the wind and causes it to drop its load, and form a drift. A sand dune two miles long and forty to sixty feet deep has thus been built on the west bank of the Weber river cutting off the view of the lake. The Globe mill stands on this dune; the West Ogden schoolhouse is at the north end of it. The sand to build the dune was carried into the valley by the Weber river and has been transported north by the prevailing south winds.

"The dune will naturally continue to move north, since the sand and the wind are still there, but if many buildings or even fences are constructed the sand will stop where these obstructions are and the dune will not continue traveling farther north.

"In traveling to Portland, we observe dunes as we first reach the Columbia river. Extensive dunes occur on the Michigan side of Lake Michigan. The Wright brothers made their first flight on sand dunes on the Atlantic coast of North Carolina.

"Deltas and alluvial fans are built up at the mouths of streams from detritus brought down by them. A delta is built up until the material comes above the surface and forms land as the present mouth of Weber river. An alluvial fan may be built where a river comes out of the mountains, but there is no body of water, or built up wholly under water, but not reaching to the surface of the water. An alluvial fan is seen at the mouth of Taylor canyon.

"Ogden stands on an alluvial fan which in relation to the present lake is a delta formed under the water of the ancient lake. The delta is semi-circular in form and about twenty miles in diameter.

"As the lake went down both rivers cut coulees out of the delta matter, carried the eroded matter farther down and built the delta farther out into the lake. The business part of



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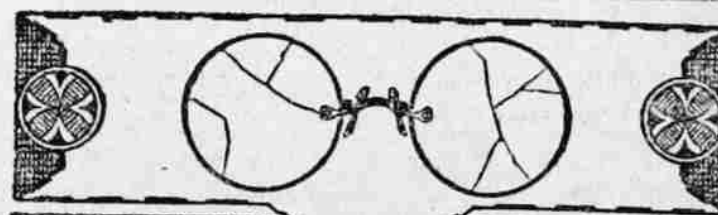
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Early Resident of Utah Dies in Ogden

Mrs. Anna Brieta Ohlsen, wife of the late Gustaf A. Ohlsen, died at 5 o'clock yesterday at the home of her daughter, Mrs. Joseph Higginbotham, 230 Twenty-third street. Mrs. Ohlsen has been an invalid for the past three years. She was born in Sweden on March 8, 1845, and was the daughter of Martin and Mary Larson Morten-

sen. She became a member of the L. E. S. church and came to Utah in October, 1867. She married Gustaf Ohlsen in 1868 and since that time had been living in Salt Lake and Ogden. She was a prominent worker in the Relief society and a Sunday school teacher. Her husband died in Salt Lake on December 11, 1912. She was the mother of nine children. The following survive here: Mrs. T. H. Carr, Mrs. J. F. Higginbotham and Mrs. Henry G. Friese. Two of her daughters, Mrs. Joseph Cave and Mrs. John Murphy recently died. She is also survived by twelve grandchildren and three great grandchildren. Funeral services will be held Monday at 2 o'clock in the Eighth ward meeting house. Bishop W. W. Rawson will officiate. The body may be viewed at the home of Mrs. Higginbotham at the home of Mrs. Higginbotham Sunday after 3 o'clock and Monday until the time of the services. Interment will be in the Ogden City cemetery.



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